STATE OF ILLINOIS

ILLINOIS COMMERCE COMMISSION

COMMONWEALTH EDISON COMPANY	:	
	:	
Petition for approval of delivery services tariffs and tariff revisions and residential delivery services implementation plan, and for approval of certain other amendments and additions to its rates, terms, and conditions.	:	No. 01-

Direct Testimony of

CHRISTOPHER LEE CULP, PH.D.

Principal and Managing Director
CP Risk Management LLC.

Q. What is your name and business address?

A. My name is Christopher Lee Culp. The business address is 140 South Dearborn Street, Suite 1500, in the City of Chicago, the State of Illinois.

Q. What is the purpose of your testimony?

A. I have been asked to comment on how various financial risks associated with the transmission and distribution of electrical power may impact the cost of capital of Commonwealth Edison in its role as a power distributor. Specifically, I have been asked to consider how the re-structuring of the power supply business in general and the Exelon/Commonwealth Edison companies in particular may come to bear on the cost of capital required by ComEd to honor its transmission and distribution/delivery ("T&D") obligations. I have also been asked to comment on the effect of leverage on the cost of equity capital.

Background & Qualifications

Q. Where are you employed?

A. My primary place of employment is CP Risk Management LLC, a subsidiary of Chicago Partners LLC. At CP Risk Management, I am a principal and managing director. I engage regularly in field consulting work and new business development, and I also coordinate the practice more generally for the provision of expert consulting services in risk measurement, capital asset valuation, the allocation of risk capital, and the integration of corporate strategy, corporate finance, and corporate risk management. My clients have included non-financial corporations (including some energy companies), banks, insurance brokers, and other financial institutions.

I am also employed as an Adjunct Associate Professor of Finance at the Graduate School of Business at The University of Chicago, where I teach a course entitled "Futures, Forwards, Options, and Swaps—Theory and Practice." The course provides instruction on the strategy and tactics of "derivatives" and their use in corporate risk management and trading activities. Included in this class is a discussion of electricity derivatives, risk management, and power marketing activities.

Q. Have you done any writing or research on areas that might be relevant here?

A. Attached as Exhibit 10.1 is my curriculum vitae which lists most of my published materials on issues such as risk management, risk capital allocation, risk-adjusted performance measurement, investment management, and corporate finance and regulation. I am the co-editor with Merton H. Miller of *Corporate Hedging in Theory and Practice* (London: Risk Books) and the sole author of *The Risk Management Process: Business Strategy and Tactics* (New York: John Wiley and Sons).

Q. Do you have practical experience in the area of power specifically?

A. As a consultant and in other capacities, I have had significant exposure to energy markets in general and electricity markets in particular. Either directly or as a subcontractor through other consulting firms, I have provided consulting services to several major U.S. utilities and power marketing organizations, to a rural electric company in the United Kingdom, and to several entities involved in the clearing and settlement of power transactions. In addition, I led a team on a consulting engagement to assist the Office of the Inspector General of the Tennessee Valley Authority in its evaluation of the risk management infrastructure in TVA's power supply and power marketing business.

Q. What about your experience with risk management more generally?

A. Apart from my energy-specific expertise, I have considerable experience in assessing the financial risks of a wide variety of other organizations, ranging from non-financial corporations to banks and insurance companies. My risk management experience includes processes and policies, integrating risk management with corporate finance and strategy, and analytical issues such as capital asset valuation, forward curve construction, market and credit risk measurement, and the like. Against all of this consulting experience is a backdrop of a solid grounding in corporate finance. More specifically, I have spent considerable time helping organizations evaluate how their financial risks impact (or should impact) their corporate financing and capital budgeting decisions.

Q. What is your educational background?

A. I have a Ph.D. from the Graduate School of Business at The University of Chicago, where my primary specialization was finance and my secondary concentrations included business economics, econometrics, and industrial organization. I also hold a B.A. in economics from The Johns Hopkins University, where I graduated Phi Beta Kappa and with both general honors and departmental honors.

Effect of Risk on Utility Cost of Capital

Q. Would you please explain generally the relationship between a firm's cost of capital and risk?

A. Yes. Risks that cause variation in a firm's cash flows can cause investors in that firm to require higher rates of return to compensate for these risks and therefore raise that firm's

cost of capital. These risks can be systematic, i.e. common to *all* asset prices, company values, and cash flow net present values in the economy, or firm-specific.

Q. How is a firm's cost of capital affected by firm-specific risk?

A. In order to understand that, it will be helpful to discuss the usual or "textbook" case in which only systematic risk matters.

Under the assumptions of well-accepted financial models, the cost of capital for the firm is determined by systematic risks but cannot be impacted by any firm-specific risks. Systematic risks are common risk factors that affect *all* asset prices, company values, and cash flow net present values in the economy. Most mainstream models relating the expected return on a firm to its systematic risks take the following general form:

$$E(R) = \alpha + \beta_j \delta_j + \beta_2\delta_2 + ... + \beta_N\delta_N$$

where α is the risk free rate, E(R) is the expected return on the firm, δ_j is the j^{th} "systematic risk factor" influencing expected returns, and β_j is the level of systematic risk j in this particular firm. As shown, the firm's cost of capital may be influenced by N possible systematic risk factors. (For a comprehensive and recent survey of modern asset pricing models and methods *see* Cochrane, J.H. 2001. *Asset Pricing*. Princeton, N.J.: Princeton University Press).

Under certain assumptions, the classic single-factor capital asset pricing model ("CAPM") of Sharpe, Lintner, Black, and Mossin results, and the single risk factor (*i.e.*, N=1) is the excess expected return on the market portfolio. The price of that risk in our company is then the covariance of returns on our firm with returns on the market

portfolio, divided by the variance of the return on the market portfolio—*i.e.,* the well-known CAPM "beta."

But under other assumptions, a multi-factor version of this model implies that the expected return on a firm may be proportional to the covariance of returns on that firm with *several* portfolios that mimic underlying systematic risk factors. Corporate finance and asset pricing theory and the empirical academic literatures do not yield an unambiguous prescription for which model of how corporate expected returns are determined in equilibrium is "correct" and the relevance of a particular model can depend on the particular circumstances and firms examined.

Q. Under what assumptions is a firm's cost of capital determined only by systematic risk (and hence unaffected by firm-specific risks)?

A. These assumptions are:

- *Perfect and Complete Capital Markets:* Capital markets are perfect in the sense of no taxes, no transaction costs, no institutional frictions (*e.g.,* short selling restrictions), and no costs of bankruptcy and are complete in the sense that financial contracts can be costlessly written that provide protection against any possible state of nature;

- *Symmetric Information:* All investors, firms, and firm managers have the same information *and* have perceptions concerning the impact of new information on security prices that are both true and identical across investors;

- *Given Investment Strategies:* Investment decisions by firms are taken as a given and as independent from financing decisions;

- *Equal Access:* Firms and individuals can issue the same securities in the capital markets on exactly the same terms; and

- *Maximizing Security Holder Welfare:* The goal of "the firm" is maximizing the combined welfare of its security holders.

Fama (1976) provides a robust discussion of the importance of these assumptions, as well as when they can be relaxed and replaced with other assumptions.[1] For the purposes of my direct testimony, none of the alternative assumptions explored in Fama (1976) make any difference to the materiality of my conclusions.

Q. Why do these assumptions lead to the conclusion that a firm's cost of capital is affected only by systematic risk?

A. When the above assumptions hold, firm-specific risks can always be costlessly eliminated either by investors in the firm through their portfolio management decisions or by the firm itself through financial hedging decisions. Under these assumptions, two corporations with identical assets cannot have different values simply because they choose different debt-equity ratios, different sources of leverage, or different financial policies.

Q. Can you provide some examples of how, under the five assumptions, the financial risks facing a firm can be largely diversified or hedged?

A. Yes. Take a company, Utility XYZ, whose sole business is distributing power. The revenues of the company that ultimately determine the value of its equity can fluctuate because of changes in customer demand, outages, the cost of maintaining wires, and other business considerations. Further, equity holders experience changes in capital value and/or dividends when the purchase price for power bought from power generators

[1] Fama, E.F. 1976. "The Effects of a Firm's Investment and Financing Decisions on the Welfare of Its Security Holders." *American Economic Review.* Vol. 68, No. 3.

changes—or, at least, when the price paid for purchased power does not at least equal the price customers are charged to receive that power on a time-weighted basis.

I noted above that diversifiable risks can be "undone" either by the firm or by investors when the five critical assumptions hold. In this example where the risk in question is electricity price risk, consider first the case where the firm gets rid of the risk directly. If the company can hedge its power purchase costs by using financial contracts that match input and output prices *for every possible demand level*, it can eliminate its price risk. In a practical context, this could be prohibitively costly but under the five assumptions noted earlier, however, this hedging can be done at a presumed cost of zero.

Now consider this alternative method of eliminating price risk. If investors in Utility XYZ have no other investments at all and desire to be averse to the impact of power price changes on the value of their investment, they could simply choose to buy stock in, say, a power generator. When the wholesale power price rises, the generator experiences an increase in its profit margin. As long as the investors have been careful to hold the right proportions of generator and distributor stocks, the impact of power price changes should wash out across the two investments. Again, although such success is certain under the five assumptions, it is unlikely in practice.

Thus, under the five assumptions above, the only risks that affect the value of the firm in equilibrium—and its cost of capital—are the risks that the firm cannot diversify away nor hedge -- the systematic risks represented in models like the CAPM.

Q. Does this mean that if a risk can be hedged, it does not impact the cost of capital of a firm?

A. Not necessarily. Even systematic risk can sometimes appear to be hedgeable. In the CAPM, for example, the excess return on the market is the systematic risk factor, and this can be hedged using products like S&P 500 futures. But because the "risk premium" on the market as a systematic risk factor is positive, shorting the market has a negative expected return. In other words, I can hedge the systematic risk, but I pay for the hedge through a negative expected return. What is important to recognize is the critical distinction between systematic and firm-specific risk. Systematic risk always impacts a firm's cost of capital even when it can be "hedged," whereas firm-specific risk does not as long as the five assumptions hold.

Q. How does a firm's leverage affect its cost of capital under the five assumptions?

A. Leverage changes the risk of the firm's equity but under the five assumptions does not change the value of the firm. When a company has debt in the capital structure, the cost of equity to the firm is equal to the cost of equity for an unlevered firm plus a risk premium. This risk premium is based on the difference between the cost of equity and debt to an unlevered firm, the proportion of leverage, and whatever tax effects need to be considered on the debt. This has become a standard method, proposed by Miller, for calculating a weighted average cost of capital.[2] Similar adjustments can also be made, such as the CAPM-specific adjustment proposed by Hamada. They are essentially the same thing, but the Hamada model is sometimes easier to implement when the CAPM is presumed to be the relevant model of systematic risk.

[2] Modigliani, F., and M. H. Miller. 1958. "The Cost of Capital, Corporation Finance, and the Theory of Investment." *American Economic Review*. Vol. 47.

Q. What are the implications if one or more of the five assumptions do not hold?

A. As I explain in great detail in my textbook[3], depending on which assumption is violated, an important implication is that investors or the firm will not be able to completely eliminate risks specific to the firm at fair market prices. As a result, these firm-specific risks plus systematic risks may then affect the value of a firm and its cost of capital. In most practical cases where firms cannot hedge their specific risks and investors cannot diversify them away—at least at a reasonable cost—the resulting cost of capital will be higher than the cost of capital that would prevail if only systematic risks matter.

Leverage changes the equity cost of capital in a similar manner as described above when the five assumptions hold. When the five assumptions do not hold, leverage can exacerbate the implications of being unable to hedge and drive the cost of capital up even further. I also explain this in some detail in my text.

Effect of Risk on ComEd

Q. Do you believe that firm-specific risks can be completely hedged or diversified away in the environment in which ComEd operates?

A. No.

Q. Why do you say this?

A. One feature that is unique to utilities like ComEd is that their legal responsibilities as a T&D provider extend to the mandated role as the provider or supplier of last resort of

[3] Culp, C.L. 2001. *The Risk Management Process*. New York, N.Y.: John Wiley & Sons.

energy. The direct testimony of Professor Peltzman, ComEd Exhibit 9.0, discusses some of the issues and risks that this role creates for ComEd.

Q. How does ComEd's power purchase agreement with Exelon Generation affect the risks arising from ComEd's responsibilities as the provider of last resort?

A. As Professor Peltzman explains in his testimony, ComEd's power purchase agreement with Exelon Generation provides fixed price protection only through 2004, but the equity market will look beyond that date. Accordingly, as Professor Peltzman concludes, the risks from increased price volatility that ComEd will bear in the future will be priced into ComEd's equity today.

Q. Can you provide an example of the type of risk that arises from ComEd's responsibility as provider of last resort?

A. Yes. In some cases, for example, ComEd faces the risk of default from Retail Electricity Suppliers ("RESs"). Should a RES fail to honor its supply obligation, ComEd must step in. This may well require ComEd to purchase power at then-prevailing spot market prices (*i.e.*, on an unhedged basis), which exposes ComEd to potentially significant market price risks. In addition, ComEd's obligation to be provider of last resort forces ComEd to allocate scarce capital to its supply chain infrastructure *and* financial risk management activities in order to help ensure that it is indeed able to function as a provider of last resort.

Q. You have explained that, under the "textbook" case in which only systematic risk matters, it is assumed that firm-specific risks can be costlessly eliminated either by the

firm itself through financial hedging transactions or by investors in the firm through their portfolio management decisions. In your opinion, can ComEd costlessly eliminate the risks of its responsibilities as provider of last resort through financial hedging transactions?

A. No. ComEd likely will be unable to hedge all the risks associated with its unique and risky position as provider of last resort, and certainly will be unable to do so costlessly. Assuming that the risk could be eliminated completely through a hedge transaction, the price that a swap dealer would charge ComEd for such a hedge would likely reflect the significant cost of *all* risks transferred by ComEd to the swap dealer.

Q. In your opinion, could investors costlessly eliminate the risks of ComEd's responsibilities as provider of last resort through their portfolio management decisions?

A. No. Investors cannot simply short the stock of another provider of last resort for the purpose of diversifying their exposure to these risks because another provider of last resort does not exist in the same market. Although providers of last resort exist in other geographic markets, the risks of these companies, after all, are slightly different because of differences in geographical demand and supply, as well as T&D charges and wheeling risks. Consequently, the risks that result from being the provider of last resort cannot practically be undone through securities or derivatives transactions. The cost of capital for ComEd as provider of last resort that investors will require to compensate them for bearing these additional risks will be higher therefore than estimated via a pure systematic risk-based cost of capital methods.

Q. Are there other reasons to believe that ComEd faces risks that are either impractical to hedge or problematic for investors to diversify away?

A. Yes. Because electricity markets are so new, there is a compelling reason to believe that quite a few other risks ComEd bears in the T&D business cannot easily be diversified away. As above, the cost of a hedge is likely to be so high that ComEd will be indifferent between retaining the risk and acquiring the hedge—and will have a higher cost of capital in both cases as a result.

Because power markets are new, these markets are not necessarily "complete" in the financial economics sense. In a complete market, a firm should be able to hedge every diversifiable risk that it has using some financial contract. Alternatively, investors should be able to buy and sell securities that allow them to eliminate every diversifiable firm-specific risk through diversification decisions. One reason markets are not always complete in this sense, however, is the cost and risk to firms of entering into contracts that are long term, based on exotic or new underlying risk factors, or too situation- and firm-specific.

As Professor Peltzman has explained and I have noted earlier above, one of the risks of the power supply business concerns the ability of suppliers to eliminate price risks arising from differences in the price paid to purchase power from generators and the price at which that power can be sold to customers. Part of this risk involves not just being able to match purchase and sale prices, but being able to match purchase and sale prices *for every potential demand scenario*. In other words, to perfectly hedge its price risk, the supplier must be able to mimic the tariff paid for power in the customer rate schedule in terms of both price *and* quantity of power supplied and purchased.

Alternatively, ComEd could enter into a financial contract like a swap or option that covers any differences. But when transaction costs are high, major disparities exist in the information possessed about power markets by different market participants, and different firms can issue securities and conduct transactions on unequal terms, financial hedging solutions may simply not be available. Unless investors can identify some traded stock whose price risk characteristics happen to be perfectly correlated with ComEd's—and that is hardly likely—the expected return required by investors in ComEd will need to be higher than the standard models might predict in order to compensate those investors for bearing these untransferable risks. Put another way, ComEd has to pay a higher cost to acquire capital because it has residual price risks that cannot be off-loaded to the capital market at a reasonable cost.

Q. Are there any other examples of risks that can not be completely hedged or diversified?

A. In fact, we could find quite a number of other risks that re-structuring, regulation, and the evolving nature of the market create that may be difficult for investors to diversify away or for ComEd to hedge perfectly.

Q. Does this complete your testimony?

A. Yes.

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CURRENT EMPLOYMENT:

CP Risk Management, LLC

Managing Director (1997 - present)

Graduate School of Business, The University of Chicago

Adjunct Associate Professor of Finance (1998 – present)

EDUCATION:

Ph.D. GRADUATE SCHOOL OF BUSINESS, THE UNIVERSITY OF CHICAGO
Finance

B.A. THE JOHNS HOPKINS UNIVERSITY
Economics (Phi Beta Kappa, Departmental Honors, General Honors)

RECENT PROJECT EXPERIENCE:

Review and Development of Risk Management Processes:

- Team member in review of enterprise-wide market risk management at the Tennessee Valley Authority (largest U.S. electric utility) on behalf of its Congressionally appointed Inspector General.
- Participated in comprehensive market risk management process review at a U.K. rural electric company.
- Supervised the measurement of quantitative market risk exposure for disclosure purposes at several U.S. non-financial corporations, including Waste Management, Inc., and Smith International, Inc.
- Reviewed the market risk measurement models and risk management infrastructure at First Options of Chicago, Inc. (top ten U.S. options broker) for insurance due diligence purposes.
- Team member in market risk management process review of options trading affiliate of a major U.S. retail discount options brokerage on behalf of its joint venture partner for due diligence purposes.
- Assisted in re-engineering the risk management unit of the London Stock Exchange.

Risk Exposure Modeling and Analysis:

- Evaluated and helped re-design the swap credit risk measurement model at a global investment bank with over US$500 billion assets under management.
- Directed the review and evaluation of the asset/liability management department and quantitative risk measurement models at AgFirst, a US$2 billion agricultural bank a member of the U.S. Farm Credit System.

- Participated in both qualitative and quantitative evaluations of risk management and surveillance at several major global securities and derivatives clearing houses on behalf of insurance underwriter(s) and/or broker for due diligence purposes. Exchanges and clearing houses evaluated include the Sydney Futures Exchange, Australian Derivatives Exchange, JIWAY (joint venture of OM Gruppen AB and Morgan Stanley Dean Witter), Stock Exchange of Singapore, Swiss Stock Exchange, SIS SEGAINTERSETTLE, London Stock Exchange, OM Gruppen AB, and Hong Kong Securities Clearing Corp.
- Team member in the review and evaluation of the asset/liability management for a hedged mortgage portfolio at Provident Bank of Maryland, a US$3 billion commercial bank.
- Team member in the review of the hedging strategy of a municipal bond securitized products vehicle.
- Evaluated and tested an electricity derivatives pricing model for due diligence purposes on behalf of an accounting firm considering the acquisition of the model.

Corporate Strategy and Risk Management:

- Participated in the evaluation of IT strategy and risk management systems at the State of Wisconsin Investment Board, a US$65 billion pension plan. Ongoing risk management advisor to SWIB since 1995.
- Helped oversee the development of a value at risk system by Mellon Trust, a US$2 trillion custodian, for its institutional clients. Ongoing risk systems advisor to Russell/Mellon Analytical Services since 1996.
- Team member in software selection project to identify risk measurement software solutions for the FCM subsidiary of a Japanese bank.
- Member of strategic consulting team engaged to review the strategic plan of DaimlerChrysler Capital Services (debis) AG in Berlin for the development of new trade financing products for customers.
- Team member in review of risk management reporting in private bank client reports supplied by Crédit Agricole Indousez (Suisse) SA.
- Team member in strategic planning review at a major commodities trading firm in the integration of risk management tools into an e-commerce strategy.

SELECTED PRIOR PROFESSIONAL EXPERIENCE:

RISK MANAGEMENT CONSULTING SERVICES, INC. (CHICAGO, IL)

President, (1994 - 1997)

Supervised and managed specialty consulting firm. Projects included risk measurement model development and review, risk management process review, asset valuation advisory services, and strategic planning advisory services. Also provided training services for risk management, derivatives, and corporate finance. Clients included securities and futures exchanges, commercial and investment banks, insurance companies, trade associations, law firms, accounting firms, and public utilities.

FEDERAL RESERVE BANK OF CHICAGO, SUPERVISION & REGULATION DEPARTMENT, FINANCIAL MARKETS UNIT (CHICAGO, IL)

Administrative Examiner, (1994)
Senior Examiner, (1993)

Supervised and conducted reviews of mathematical models used for financial risk measurement by Seventh District money-center commercial banks. Assisted Reserve Bank and Board staff in various policy work concerning derivatives supervision, member-bank risk management systems, and some payments system issues.

TRADELINK, LLC (CHICAGO, IL)

Futures and Options Trading Strategist, (1992 - 1993)

Designed and implemented proprietary foreign exchange futures and options trading models, and made trade recommendations aimed at implementing the signals from those models.

G.T. MANAGEMENT (ASIA), LIMITED (CENTRAL DISTRICT, HONG KONG)

Economist, (1991)

Researched Hong Kong government debt market. Provided analytical support for the equity portfolio management group. Researched exchange rate policy and cash settlements through the Hong Kong Association of Banks Clearinghouse.

OTHER AFFILIATIONS:

DERIVATIVES QUARTERLY
Co-Editor (1999 - present)
Managing Editor (1997 - 1999)
COMPETITIVE ENTERPRISE INSTITUTE
Senior Fellow in Financial Regulation (1994 - present)

FIELDS OF SPECIALIZATION:

Derivatives
Risk Measurement
Capital Asset Valuation
Corporate Finance
Financial Law and Regulation
Applied Econometrics

PROFESSIONAL AFFILIATIONS:

American Finance Association
Financial Management Association
Global Association of Risk Professionals
International Association of Financial Engineers

SELECTED TEACHING EXPERIENCE:

EXECUTIVE EDUCATION PROGRAM, GRADUATE SCHOOL OF BUSINESS, THE UNIVERSITY OF CHICAGO
Co-Instructor, "Risk Management for Executives," 1999 - present
MBA PROGRAM, GRADUATE SCHOOL OF BUSINESS, THE UNIVERSITY OF CHICAGO
Instructor, "Futures, Forwards, Options, and Swaps: Theory and Practice," 1998-present
INTERNATIONAL FINANCE CORPORATION
Co-Instructor, "Financial Controls for Derivatives," Washington, D.C. (June 1998)
STATE OF WISCONSIN INVESTMENT BOARD
Instructor, "The Mathematics of Risk Measurement and Capital Asset Pricing," Madison, WI (1997)
KPMG PEAT MARWICK
Instructor, "The Mathematics of Risk Measurement," presented to Senior Managers' Training, Washington, DC (1996)
ARTHUR ANDERSEN LLP
Instructor, "Mathematics for Risk Measurement and Option Valuation," presented to Senior Managers' Training, New York, NY (1996)
BANCO BILBAO VIZCAYA
Instructor, "Options and Structured Note Valuation Using Stochastic Calculus," presented to Senior Trader Training Program, Madrid, Spain (1995) (taught jointly with Ibbotson Associates)

SELECTED PUBLICATIONS:

The Risk Management Process: Business Strategy and Tactics. New York: John Wiley & Sons, forthcoming 2001.

"*Ex Ante* vs. *Ex Post* RAROC. " *Derivatives Quarterly* Vol. 7, No. 1 (Fall 2000).

"New Risk Culture: An Opportunity for Business Growth and Innovation." *Derivatives Quarterly* Vol. 6, No. 4 (Summer 2000). (with Philippe Planchat)

"Revisiting RAROC." *Journal of Lending and Credit Risk Management* (March 2000).

"Wettbewerbsnachteile für Schweizer Banken? Konsultativpapier des Basler Ausschusses mit Schwächen." *Neue Zürcher Zeitung* (15 Oktober 1999).

"Measuring Risk for Asset Allocation, Performance Evaluation, and Risk Control: Different Problems, Different Solutions." *Journal of Performance Measurement* Vol. 4, No. 1 (Fall 1999). (with Ron Mensink)

Corporate Hedging in Theory and Practice: Lessons from Metallgesellschaft. London: Risk Publications, 1999. (co-edited with Merton H. Miller)

Risk Management and Systemic Risk in Securities and Multi-currency Funds Transfer Systems. Washington, D.C.: Competitive Enterprise Institute, June 1999. (with Andrea M.P. Neves)

"A Review of *Worldwide Asset and Liability Modeling*." *Financial Engineering News* (June 1999).

"Derivative Diagnosis." *The International Economy* Vol. 13, No. 3 (May/June 1999). (with Steve H. Hanke and Andrea M.P. Neves)

"The Case for an Indonesian Currency Board." *Journal of Applied Corporate Finance* Vol. 11, No. 4 (Winter 1999). (with Steve H. Hanke and Merton H. Miller)

"Value at Risk for Asset Managers." *Derivatives Quarterly* Vol. 5, No. 2 (Winter 1998). (with Ron Mensink and Andrea M.P. Neves)

"Derivatives Regulation: Problems and Prospects." *Derivatives Use, Trading & Regulation* Vol. 4, No. 2 (1998).

"Use and Misuse of a Risk Management Tool." *Pensions & Investments* (August 24, 1998). (with Ron Mensink)

"Credit and Interest Rate Risk in the Business of Banking." *Derivatives Quarterly* Vol. 4, No. 4 (Summer 1998). (with Andrea M.P. Neves)

"Financial Innovations in Leveraged Commercial Loan Markets." *Journal of Applied Corporate Finance* Vol. 11, No. 2 (Summer 1998). (with Andrea M.P. Neves)

"Value at Risk: Uses and Abuses." *Journal of Applied Corporate Finance* Vol. 10, No. 4 (Winter 1998). (with Merton H. Miller and Andrea M.P. Neves)

The Role of Eurodeposit Futures in Swap Rate Determination: An Empirical Analysis. Doctoral dissertation, Graduate School of Business, The University of Chicago (December 1997).

"Risk Management by Securities Settlement Agents." *Journal of Applied Corporate Finance* Vol. 10, No. 3 (Fall 1997). (with Andrea M.P. Neves)

"Risk, Returns and Retirement." *Risk* Vol. 10, No. 10 (October 1997). (with Kamaryn Tanner and Ron Mensink)

"A Review of *The US Power Market: Restructuring and Risk Management.*" *Risk* Vol. 10, No. 9 (September 1997). (with Andrea M.P. Neves)

"An Introduction to Structured Notes." *Derivatives: Tax, Regulation and Finance* Vol. 2, No. 4 (March/April 1997). (with Robert J. Mackay)

"Are Financial Regulations Worth the Cost?" *MFA Reporter* (July 1996).

"Some Characteristics of a Successful Futures Contract." *Futures and Derivatives Law Report* Vol. 16, No. 5 (July 1996).

"The SEC's Costly Disclosure Rules." *Wall Street Journal* (June 22, 1996). (with Merton H. Miller)

"Choosing Your Exposure, or The Art of Sound Risk Management." *Risk: Latin American Derivatives* (April 1996). (with Robert J. Mackay)

"An Overview of Derivatives: Their Mechanics, Participants, Scope of Activity, and Benefits." In *The Financial Services Revolution.* Ed. Clifford Kirsch. Chicago, IL: Irwin Professional Publishing, 1996. (with James A. Overdahl)

"Structured Notes: Mechanics, Benefits, and Risks." In *Derivatives Risk and Responsibility*. Ed. Robert A. Klein and Jess Lederman. Chicago, IL: Irwin Professional Publishing, 1996. (with Robert J. Mackay)

"Regulatory Uncertainty and the Economics of Derivatives Regulation." *The Financier: Analysis of Capital and Money Market Transactions* Vol. 2, No. 5 (December 1995).

"Why the CFTC Is an Anachronism." *Wall Street Journal* (September 5, 1995). (with Merton H. Miller)

"Rein in the CFTC." *Wall Street Journal* (August 17, 1995). (with Merton H. Miller)

A Primer on Derivatives. Chicago, Ill. and Washington, D.C.: Board of Trade of the City of Chicago, and Competitive Enterprise Institute, July 1995.

"Hedging in the Theory of Corporate Finance." *Journal of Applied Corporate Finance* Vol. 8, No. 1 (Spring 1995). (with Merton H. Miller)

"Basis Risk and Hedging Strategies." *Derivatives Quarterly* Vol. 1, No. 4 (Summer 1995). (with Merton H. Miller)

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"Auditing the Auditors." *Risk* Vol. 8, No. 4 (April 1995). (with Merton H. Miller)

"Derivatives: A Lesson from 60 Minutes." *MediaNomics* Vol. 3, No. 3 (April 1995).

"Metallgesellschaft and the Economics of Synthetic Storage." *Journal of Applied Corporate Finance* Vol. 7, No. 4 (Winter 1995). (with Merton H. Miller)

"Hedging a Flow of Commodity Deliveries with Futures: Lessons from Metallgesellschaft." *Derivatives Quarterly* Vol. 1, No. 1 (Fall 1994). (with Merton H. Miller)

"Regulating Derivatives: The Current System and Proposed Changes." *Regulation* Vol. 4 (Fall 1994). (with Robert J. Mackay)

"Structured Debt and Corporate Risk Management." *Journal of Applied Corporate Finance* Vol. 7, No. 3 (Fall 1994). (with Dean Furbush and Barbara T. Kavanagh)

"Slaughter Those Sacred Cows." *Risk* Vol. 7, No. 11 (November 1994). (with Merton H. Miller)

"Pummeling Derivatives: Why Sometimes the Wise Choice is to Proceed Slowly." *The International Economy* Vol. 8, No. 5 (September/October 1994). (with Steve H. Hanke)

"Derivatives Dingbats." *The International Economy* Vol. 8, No. 4 (July/August 1994). (with Steve H. Hanke)

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"Taking Issue with the Brady Report." *Chicago Tribune* (April 30, 1988).

ADDITIONAL INFORMATION:

LANGUAGES:

Fluent in English (written and spoken)
Working knowledge (spoken) of Schwyzerdeutsche

STATISTICAL AND COMPUTER SKILLS:

Programming/Database Management: FORTRAN95, FORTRAN77, Some SQL
Statistical and Mathematical: SAS, RATS
Operating Systems: VMS, Unix, DOS, Windows95/98/NT
Other: Microsoft Office

SECURITY CLEARANCES ISSUED:

Federal Reserve Bank of Chicago (Assistant Examiner Commission and Clearance)
United States Department of State Office of the Ambassador-at-Large for Counter-terrorism (Top Secret)

RESEARCH GRANTS:

Doctoral Research Fellowship, The University of Chicago (1990-1993)
Claude R. Lambe Fellowship, Institute for Humane Studies (1993)

PERSONAL ACTIVITIES:

Vice-Chairman, Finance, Executive Committee of the Governing Board of The Chicago Symphony Orchestra (2000-2003 term)
Chairman of The Chicago Symphony Orchestra Holiday Concerts Committee (1999)
Governing Member, The Orchestral Association of The Chicago Symphony Orchestra